

What is claimed is:

1. A method for manufacturing liquid crystal display device comprising:

5 forming a first substrate by coating a photopolymer material layer on a support substrate having a buffer layer and having the support substrate exposed under ultra violet and hardened, then coating an alignment layer on the exposed and hardened photopolymer material layer;

10 forming a second substrate having a plurality of polymer walls by coating an alignment layer on a substrate having electrode patterns, then coating a photopolymer material layer on the substrate, having the substrate exposed by masking and hardened, generating a plurality of cavities between a plurality of polymer walls, and injecting a mixture of liquid crystal and
15 small amount of photopolymer; and

 coupling the first substrate and the second substrate by having the support substrate of the first substrate aligned with the substrate of the second substrate aligned, performing a mask exposure for coupling the support substrate to the substrate via
20 photopolymerization, completing the phase separation between the liquid crystal and the photopolymer material, wrapping the liquid crystal materials with the photopolymer material, then

separating the support substrate from the substrate.

2. The method for manufacturing liquid crystal display device of claim 1, wherein alternatively a plurality of polymer walls are formed by coating a photopolymer material layer on the
5 substrate on the substrate having electrode patterns, the substrate is molded and exposed under linear ultra violet, then the photopolymer material layer are hardened and forms a polymer wall with alignment.
3. The method for manufacturing liquid crystal display device of claim 1, wherein the photopolymer material is photocurable
10 resin.
4. The method for manufacturing liquid crystal display device of claim 1, wherein the materials of support substrate or substrate is glass, chipsets, teflon or plastic.
- 15 5. The method for manufacturing liquid crystal display device of claim 2, the material of the electrode patterns is a conducting film.
6. The method for manufacturing liquid crystal display device of claim 5, wherein the material of the conducting film is ITO or
20 PEDOT (polyethylene-dioxithiophene).
7. The method for manufacturing liquid crystal display device of claim 1, wherein the material of the buffer layer is PE/PEWax,

long chain aliphatics, silicone, or teflon.

8. The method for manufacturing liquid crystal display device of claim 1, wherein the step of forming the first substrate further comprises a sub step of forming a electrode patterns on the support substrate of the first substrate.
9. The method for manufacturing liquid crystal display device of claim 1, the alignment layer is formed by coating an alignment layer with rubbing alignment, photo alignment, ion beam alignment or micro texture structure alignment.
10. The method for manufacturing liquid crystal display device of claim 9, wherein the micro texture structure alignment is performed by molding a special designed mold pattern, so as to form the polymer wall and the micro texture structure alignment.
11. The method for manufacturing liquid crystal display device of claim 9, wherein the alignment material is polyimide, polyamic acid or a photo alignment material.
12. The method for manufacturing liquid crystal display device of claim 1, wherein the step of forming the first and second substrates further comprises a sub step of forming projections so as to allow the liquid crystal display device having a wide viewing angle. ◦

13. The method for manufacturing liquid crystal display device of claim 12, wherein the projections are formed by molding a special designed mold pattern, so as to generate a wide viewing angle of multi domain.
- 5 14. The method for manufacturing liquid crystal display device of claim 1, wherein the polymer wall formed by photopolymer material is a closed matrix polymer wall.
15. The method for manufacturing liquid crystal display device of claim 1, wherein the polymer wall formed by photopolymer
10 material is a non-closed matrix polymer wall.
16. The method for manufacturing liquid crystal display device of claim 1, wherein the mixture of photopolymer material is composed of a photopolymer material and a liquid crystal material.
- 15 17. The method for manufacturing liquid crystal display device of claim 1, wherein the mixture of photopolymer material further comprises spacers.
18. A method for manufacturing liquid crystal display device comprising:
- 20 forming a first substrate by coating a photopolymer material layer on a support substrate having a buffer layer and having the support substrate exposed under ultra violet and

hardened, coating a electrode pattern on the exposed and
hardened photopolymer material layer, then coating an
alignment layer on the support substrate;

forming a second substrate having a plurality of polymer
5 walls by coating a alignment layer on a substrate having
electrode patterns, then coating a photopolymer material layer
on the substrate, having the substrate exposed by masking and
hardened, generating a plurality of cavities between a plurality
of polymer walls, and injecting a mixture of liquid crystal and
10 small amount of photopolymer; and

coupling the first substrate and the second substrate by
having the support substrate of the first substrate aligned with
the substrate of the second substrate aligned, performing a mask
exposure for coupling the support substrate to the substrate via
15 photopolymerization, completing the phase separation between
the liquid crystal and the photopolymer material, wrapping the
liquid crystal materials with the photopolymer material,
separating the support substrate of the first substrate from the
substrate of the second substrate, then forming a liquid crystal
20 display device without a substrate.

19. The method for manufacturing liquid crystal display device of
claim 18, wherein the photopolymer material is photocurable
resin.

20. The method for manufacturing liquid crystal display device of claim 18, wherein the materials of the support substrate or the substrate is glass, chipsets, teflon or plastic.
21. The method for manufacturing liquid crystal display device of claim 18, the material of the electrode patterns is a conducting film.
22. The method for manufacturing liquid crystal display device of claim 21, wherein the material of the conducting film is ITO or PEDOT (polyethylene-dioxithiophene).
23. The method for manufacturing liquid crystal display device of claim 18, wherein the material of the buffer layer is PE/PEWax, long chain aliphatics, silicone, or teflon.
24. The method for manufacturing liquid crystal display device of claim 18, the alignment layer is formed by coating an alignment layer with rubbing alignment, photo alignment, ion beam alignment or micro texture structure alignment.
25. The method for manufacturing liquid crystal display device of claim 24, wherein the micro texture structure alignment is performed by molding a special designed mold pattern, so as to form the polymer wall and the micro texture structure alignment.
26. The method for manufacturing liquid crystal display device of claim 24, wherein the alignment material is polyimide, polyamic

acid or a photo alignment material.

27. The method for manufacturing liquid crystal display device of claim 18, wherein the step of forming the first and second substrates further comprises a sub step of forming projections so as to allow the liquid crystal display device having a wide viewing angle.

28. The method for manufacturing liquid crystal display device of claim 27, wherein the projections are formed by molding a special designed mold pattern, so as to generate a wide viewing angle of multi domain.

29. The method for manufacturing liquid crystal display device of claim 18, wherein the polymer wall formed by photopolymer material is a closed matrix polymer wall.

30. The method for manufacturing liquid crystal display device of claim 18, wherein the polymer wall formed by photopolymer material is a non-closed matrix polymer wall.

31. The method for manufacturing liquid crystal display device of claim 18, wherein the mixture of photopolymer material is composed of a photopolymer material and a liquid crystal material.

32. The method for manufacturing liquid crystal display device of claim 18, wherein the mixture of photopolymer material further

comprises spacers.

33. The method for manufacturing liquid crystal display device of claim 18, wherein alternatively a plurality of polymer walls are formed by coating a photopolymer material layer on the
- 5 substrate on the substrate having electrode patterns, the substrate is molded and exposed under linear ultra violet, then the photopolymer material layer are hardened and forms a polymer wall with alignment.